

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, 29(4), 549–571.

WeBWorK. (n.d.). An open-source online homework system for math and the sciences. Retrieved 6/11/2020 from <https://webwork.maa.org/>

## Supporting Underrepresented Minority Students in STEM Through In-Class Peer Tutoring

Tara C. Davis

### Description of the Program

#### Development of the Program

We will begin with the history of the program. Our institution has four concentrations within the math major, one of which is a Math Education concentration. This is more like a pure math major, and does not include an education dual degree or teaching certification, but it does include one required math tutoring class. This class, Math Education Practicum, is open to students from all concentrations, and it focuses on providing students with practical classroom tutoring experience, alongside the investigation of issues of teaching and learning mathematics. Originally, the student tutors worked in developmental math labs. Organizational restructuring and changes in leadership over the years led to the eventual removal of these developmental math labs. Placements were required for the math tutors enrolled in the Practicum class. This led to the practice of utilizing the tutors during class time, rather than in an outside of class tutoring lab.

There is a second dimension to the development of this program. In addition to requiring placements for the Math Education majors enrolled in the Practicum class, we required employment for our students funded by the Louis Stokes Alliance for Minority Participation (LSAMP) [IOA-LSAMP NSF grant #HRD 1826864]. At the same time as the developmental math labs were being phased out, we were redefining the scope of student work under the LSAMP grant. Students meeting the criteria were eligible to be paid for tutoring work, and these LSAMP students constituted our second pool of potential in-class peer tutors. To qualify for LSAMP, students must be American citizens or permanent residents, maintain a 3.0 GPA, have declared

a major in a STEM field, and be an underrepresented minority (African American, Alaskan Native, American Indian, Hispanic or Pacific Islander). The main objective of HPU's LSAMP is to support Native Hawaiian and other Pacific Islander students.

### Current Status of the Program

In the current iteration of this program, students are assigned to work with a math faculty mentor as peer tutors in active learning, or inquiry-based math classrooms. It should be noted that on rare occasions there are some in-class peer tutors working at our institution who come from the Math Practicum pool, who are from groups over-represented in STEM (e.g., Japanese males. However, all LSAMP students, and the vast majority of the non-LSAMP students, are women, Hispanic, African American, Native American, or Native Hawaiian). For example, in 2018, the Math Practicum class had five students enrolled, three of whom were Pacific Islander LSAMP students, one was Hispanic, and the other was international. Another semester the class was over 65% Native Hawaiian. The program as it relates to this article will focus on the use of all student tutors, not exclusively on those from any racial or ethnic category, though as noted above, the majority of our peer tutors belong to groups that are historically underrepresented in STEM.

The author, who oversees the peer tutoring program and serves as the LSAMP Campus Coordinator, would send an annual solicitation to the math faculty, looking for those who wish to support students, and who agree to utilize active learning pedagogy (so that the tutors have work to do during class). Those faculty wishing to supervise and mentor a tutor were provided with one. Student tutors were selected through a formal application process for the LSAMP program, and to be eligible to participate, the student must be from a racial or ethnic group the NSF identifies as being underrepresented in STEM. In addition to the requirements for the grant, the student should have earned a high grade in the class they would be tutoring. Students were trained either through the Practicum class, or by their faculty mentor; oftentimes the tutor already had a relationship with their mentor, and had taken the class they would be tutoring so they were familiar with the material and teaching methodology. The tutors were paid an hourly stipend. The author coordinated the employment with the HR and grants office, and placement with a faculty mentor, who managed the tutor's daily activities and assignments. There are approximately 5–10 student participants in the program per year, where each tutor is able to reach dozens more students through their daily tutoring work.

The tutors worked for several different math instructors, in classes from developmental math and pre-calculus, through mid-level calculus and linear algebra, to upper-level classes like proof writing and abstract algebra. The student tutors met with their faculty mentor prior to the start of the semester to have all expectations and duties

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laid out, and the tutors request any needed aides, such as advanced copies of the class handouts, access to the class Blackboard page, or solutions to the class problems. The tutors were told what to focus on during class time, and were encouraged to ask questions of the course instructor about their duties or the course material, including math questions. The tutors who had taken the Math Education Practicum class, which was the majority of tutors, had training on facilitating student problem solving, asking guiding questions, and focusing on keeping the work with the students.

The students enrolled in the math classes who were receiving in-class tutoring primarily worked in groups at the white boards (Davis, 2019) instead of listening to a lecture during class time. A typical class period would consist of a brief introduction and motivation by the instructor, which would include the posing of a problem or set of problems for the class to work on. Then time would be given for the students to work on the problem together in previously assigned small groups at their designated white board. During this time, the peer tutor(s) would be sent to listen to the discussions and interact with the small groups as needed. Oftentimes the enrolled students would raise their hands or call for the tutor by name. The instructor

would also be available to help the small groups. Therefore, students were given individual attention each class period and would have the opportunity to ask questions in their small group to either the instructor or the peer tutor. The students often did ask questions of the tutors, who could then relay them to the instructor, who could reconvene a whole class discussion.

The program serves different math populations by focusing on the needs of the enrolled students and the faculty mentor. A developmental math class, for example, will focus more on students practicing routine problems, and the tutors may be required to help students check their answers, or answer questions in small groups. In a calculus or linear algebra class, the enrolled students may be engaged in a more complex task, which could take a large portion of a class period to complete, and in this scenario the tutor would be expected to facilitate small group discussion by listening to and giving advice on strategy, in addition to helping with basic computations and formulas.

### References

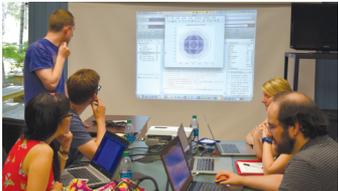
Davis, T. (2019). Everyone, go to your boards. *Mathematics in School*, 48 (1), 10–11.



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